

Application Number 10/777,391
Amendment dated October 23, 2008
Response to Office Action mailed July 23, 2008

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AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

Claim 1 (Currently Amended) A method comprising:

receiving, with a network device that supports at least three network protocols, a packet containing a first class of service (CoS) information, wherein the first CoS information specifies a class of service for the packet in a format that conforms to a first of the at least three supported network protocols used within a network;

storing, within the network device, intermediate CoS information that provides a universal classification mechanism independent of: (i) any layer two protocols used within the network, and (ii) protocols of layers on top of layer two protocols used within the network;

accessing the first CoS information within the packet to determine the class of service for the packet;

mapping the first CoS information to the intermediate CoS information based on the class of service determined for the packet;

mapping the intermediate CoS information to a second CoS information using the intermediate CoS information, wherein the second CoS information specifies the class of service for the packet in a format that conforms to a second of the at least three supported network protocols used within the network; and

outputting the packet with the network device to forward the packet within the network in accordance with the second network protocol, the packet containing the second CoS information that specifies the class of service information for the packet in accordance the second network protocol.

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Claim 2 (Currently Amended) The method of claim 1,
wherein mapping the first CoS information comprises[[:]] applying a first policy to map
the first CoS information to the intermediate CoS information,[[:]] and
wherein mapping the intermediate CoS information comprises applying a second policy
to map the intermediate CoS information to the second CoS information.

Claim 3 (Original) The method of claim 2,
wherein the first policy comprises a protocol-specific policy in accordance with the first
network protocol, and
wherein the second policy comprises a protocol-specific policy in accordance with the
second network protocol

Claim 4 (Original) The method of claim 2, further comprising:
presenting a user interface to receive input; and
configuring the first policy and the second policy based on the input.

Claim 5 (Original) The method of claim 1,
wherein receiving a packet comprises receiving the packet with a first interface of a
network device; and
wherein forwarding the packet comprises forwarding the packet with a second interface
of the network device.

Claim 6 (Original) The method of claim 5, wherein the first interface is associated with a first
interface card of a network router, and the second interface is associated with a second interface
card of the network router.

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Claim 7 (Previously Presented) The method of claim 5, further comprising:
updating, with the first interface, data included within the packet to include the intermediate CoS information; and
communicating the packet and the intermediate CoS information from the first interface to the second interface.

Claim 8 (Previously Presented) The method of claim 7, wherein updating the data included within the packet comprises adding a header to the data of the packet that specifies the intermediate CoS information.

Claim 9 (Previously Presented) The method of claim 7, wherein forwarding the packet comprises:
removing the intermediate CoS information from the data of the packet with the second interface;
updating the data of the packet to include the second CoS information; and
forwarding the packet with the second CoS information with the second interface.

Claim 10 (Original) The method of claim 1, wherein the intermediate CoS information comprises protocol-independent metadata associated with the packet.

Claim 11 (Original) The method of claim 1, wherein the first CoS information and the second CoS information each comprise one of Internet Protocol (IP) Type of Service (ToS) information, Multiprotocol Label Switching (MPLS) experimental (EXP) bits, Virtual Local Area Network (VLAN) user priority information, and Internet Protocol version 6 (IPv6) traffic class information.

Claim 12 (Original) The method of claim 1,
wherein receiving a packet comprises receiving the packet with a router; and
wherein forwarding the packet comprises forwarding the packet with the router.

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Claim 13 (Original) The method of claim 12, wherein forwarding the packet comprises forwarding the packet with a centralized forwarding engine of the router.

Claim 14 (Original) The method of claim 12, wherein forwarding the packet comprises forwarding the packet with a forwarding component within an interface card of the router.

Claim 15 (Currently Amended) A system that supports at least three network protocols, the system comprising:

a first interface to receive a packet containing data including a first class of service (CoS) information that conforms to a first one of the at least three network protocols, access the data of the packet to determine the first CoS information, and map the first CoS information to intermediate CoS information based on the first CoS information determined for the packet by updating the data of the packet, wherein the intermediate CoS information provides a universal classification mechanism independent of any layer two protocols and protocols of layers on top of layer two protocols used by the network device[[]]; and

a second interface to map the intermediate CoS information to a second CoS information that conforms to a second one of the at least three network protocols by updating the data of the packet.

Claim 16 (Original) The system of claim 15,

wherein the first interface applies a first policy to map the first CoS information to the intermediate CoS information; and

wherein the second interface applies a second policy to map the intermediate CoS information to the second CoS information.

Claim 17 (Original) The system of claim 16, wherein the first policy comprises a protocol-specific policy in accordance with the first network protocol, and the second policy comprises a protocol-specific policy in accordance with the second network protocol

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Claim 18 (Original) The system of claim 16, further comprising a management module to present a user interface to receive input, and configure the first policy and the second policy based on the input.

Claim 19 (Original) The system of claim 15, wherein the first interface is associated with a first interface card of a network router, and the second interface is associated with a second interface card of the network router.

Claim 20 (Previously Presented) The system of claim 15, wherein the first interface updates the data of the packet by adding the intermediate CoS information to the data of the packet, and communicates the updated packet having the intermediate CoS information to the second interface.

Claim 21 (Previously Presented) The system of claim 20, wherein the second interface removes the intermediate CoS information from the packet, and updates the data of the packet by adding the second CoS information to the packet.

Claim 22 (Original) The system of claim 15, wherein the intermediate CoS information comprises protocol-independent metadata associated with the packet.

Claim 23 (Original) The system of claim 15, wherein the first CoS information and the second CoS information each comprise one of Internet Protocol (IP) Type of Service (ToS) information, Multiprotocol Label Switching (MPLS) experimental (EXP) bits, Virtual Local Area Network (VLAN) user priority information, and Internet Protocol version 6 (IPv6) traffic class information.

Claim 24 (Original) The system of claim 15, wherein the first interface comprises a logical interface associated with the first protocol, and the second interface comprises a logical interface associated with the second protocol.

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Claim 25 (Original) The system of claim 15, wherein the first interface is associated with a first interface card, and the second interface is associated with the second interface card.

Claim 26 (Currently Amended) A network device that supports at least three network protocols comprising:

a control unit that:

stores intermediate class of service (CoS) information that provides a universal classification mechanism independent of any layer two protocols and protocols of layers on top of layer two protocols used by the network device;

associates the intermediate CoS information with a packet based on data within the packet that defines first CoS information, wherein the first CoS information conforms with a first one of the at least three network protocols; and

maps the associated intermediate CoS information to second CoS information, wherein the second CoS information conforms to a second one of the at least three network protocols.

Claim 27 (Original) The network device of claim 27, wherein the network device applies policies to map the first CoS information to the intermediate CoS information and to map the intermediate CoS information to the second CoS information.

Claim 28 (Original) The network device of claim 26, wherein the network device comprises a router.

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Claim 29 (Currently Amended) A computer-readable medium storing a computer program that comprises instructions to cause a processor to:

receive, with a network device that supports at least three network protocols, a packet having data including a first class of service (CoS) information, wherein the first CoS information conforms to a first one of the at least three network protocols;

store intermediate CoS information that provides a universal classification mechanism independent of any layer two protocols and protocols of layers on top of layer two protocols used by a network device;

access the data of the packet to determine the first CoS information; and
process, based on the first CoS information determined for the packet, the data of the packet ~~including the first CoS information~~ to include the intermediate CoS information, wherein the intermediate CoS information is used for mapping the first CoS information to a second CoS information that conforms to a second network protocol by updating the data of the packet.

Claim 30 (Previously Presented) The computer-readable medium of claim 29, wherein the computer program further comprises instructions to cause the processor to apply a policy to the packet to generate the intermediate CoS information from the first CoS information.

Claim 31 (Original) The computer-readable medium of claim 30, wherein the policy comprises a protocol-specific policy in accordance with the first network protocol.

Claim 32 (Original) The computer-readable medium of claim 29, wherein the intermediate CoS information comprises protocol-independent metadata associated with the packet.

Claim 33 (Original) The computer-readable medium of claim 29, wherein the first CoS information comprises one of Internet Protocol (IP) Type of Service (ToS) information, Multiprotocol Label Switching (MPLS) experimental (EXP) bits, Virtual Local Area Network (VLAN) user priority information, and Internet Protocol version 6 (IPv6) traffic class information.

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Claim 34 (Currently Amended) A method comprising:

processing a packet with a first interface of a network device that supports at least three network protocols to access data within the packet by determining one of the at least three network protocols by which the packet is received and applying one of a plurality of policies that corresponds to the determined one of the at least three network protocols to generate metadata;

associating the packet with ~~the metadata based on the data within the packet~~, wherein the metadata defines protocol-independent class of service (CoS) information, and wherein the protocol-independent CoS information provides a universal classification mechanism and is independent of any layer two protocols and protocols of layers on top of layer two used by the network device to forward packets within a network; and

subsequently processing the packet with a second interface of the network device in accordance with the protocol-independent CoS information.

Claim 35 (Currently Amended) The method of claim 34,

wherein processing the packet ~~comprises to applying a first the one of the plurality of policies~~ comprises applying a first one of the plurality of policies ~~policy~~ to the packet to map the packet to the protocol-independent CoS information, wherein the first policy is specific to a first one of the at least three network protocols, and

wherein subsequently processing the packet comprises mapping the protocol-independent CoS information to a second one of the plurality of policies ~~policy~~ that is specific to a second one of the at least three network protocols, and applying the second policy to the packet.

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Claim 36 (Previously Presented) The method of claim 35,
wherein applying the first policy comprises applying the first policy to first header information of the packet, wherein the first header information conforms to the first network protocol, and
wherein applying the second policy comprises applying the second policy to second header information of the packet, wherein the second header information conforms to the second network protocol.

Claim 37 (Currently Amended) The method of claim 34, further comprising[[:]] storing the protocol-independent CoS information as the metadata within a memory of the network device[[:]] and
associating the metadata with the packet throughout an entire packet-processing path of the network device.

Claim 38 (Cancelled).

Claim 39 (New) The method of claim 34, further comprising configuring each of the plurality of policies in accordance with input received from a user via a user interface such that the universal classification mechanism is fully customizable.